

REMARKS

In response to the Office Action mailed January 26, 2005, Applicant submits the following remarks.

Claim Objection

The Patent Office objected to claim 23 because of an informality. More specifically, the Patent Office objected to claim 23 and stated that the "a" before "source" should be deleted. Applicant has amended claim 23 as suggested by the Patent Office.

§ 112

The Patent Office rejected claims 26, 27, and 29 under 35 U.S.C. § 112, second paragraph because there is insufficient antecedent basis for "the first, second, and third regions." Applicant has amended claim 26 to replace "the first, second, and third regions" with "the source, gate, and drain regions." Applicant has amended claim 27 to replace "the first and third regions" with "the source and drain regions." Applicant has amended claim 29 to replace "the first and second regions" with "the source and drain regions." Accordingly, the rejection of claims 26, 27, and 29 under 35 U.S.C. § 112, second paragraph should be withdrawn.

§ 103

The Patent Office rejected claims 14-25 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Gaska (U.S. Patent Application Publication No. 2004/0070003) in view of Ngo (U.S. Patent No. 6,706,576). In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. According to MPEP 2143.03, "[t]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art."

Regarding claim 14, the combination of Gaska and Ngo fails to teach or suggest at least depositing a thermally assisted silicon nitride passivation layer on the one or more structural epitaxial layers before the GaN epitaxial structure is removed from an associated growth chamber. As stated in paragraph [0004] of Applicant's specification,

However, conventional methods of passivating the GaN structure, such as plasma enhanced chemical vapor deposited (PECVD) silicon nitride, occur after the growth of the GaN structure and outside of the growth

chamber used to grow the GaN structure. Therefore, the GaN structure is exposed to the atmosphere prior to fabrication of the electronic device. By exposing the GaN structure to the atmosphere, oxidation may occur on the surface of the GaN structure, thereby decreasing the effectiveness and reproducibility of the ex-situ passivation process.

Accordingly, claim 14 claims depositing a thermally assisted silicon nitride passivation layer on the one or more structural epitaxial layers before the GaN epitaxial structure is removed from an associated growth chamber. In contrast, the conventional methods of passivating a GaN structure after it is removed from a growth chamber, thereby allowing oxidation on the surface of the GaN structure.

Gaska discloses a semiconductor structure having a textured nitride-based layer. In Figure 2, the semiconductor structure (10) includes a second layer (18). As stated in paragraph [0031], the "second layer 18 can comprise a dielectric layer or composite dielectric layer comprising silicon dioxide, silicon nitride, or the like." However, Gaska fails to disclose depositing the second layer (18) before the semiconductor structure (10) is removed from an associated growth chamber. Further, nothing in Gaska teaches or suggests a departure from the conventional method of passivating a semiconductor structure by depositing the second layer (18) after the semiconductor device (10) is removed from an associated growth chamber.

In order to show the claimed step of depositing a thermally assisted silicon nitride passivation layer on the one or more structural epitaxial layers before the GaN epitaxial structure is removed from an associated growth chamber, the Patent Office states:

Gaska et al. do not explicitly show a step of removing the GaN epitaxial structure. However, it would have been obvious and known to one of ordinary skill in the art at the time the invention was made to remove the structure (as shown in figure 2) out of the associated growth chamber and process to the next operation for patterning, etching, developing ... in order to form structure as shown in figs. 4, 8, and 9. (emphasis added)

However, claim 14 does not claim removing the GaN epitaxial structure. Claim 14 claims depositing a thermally assisted silicon nitride passivation layer on the one or more structural epitaxial layers before the GaN epitaxial structure is removed from an associated growth chamber. Again, nothing in Gaska teaches or suggests depositing the second layer (18) before the semiconductor device (10) is removed from an associated growth chamber.

Combining Gaska with Ngo fails to correct this deficiency. Ngo discloses laser thermal annealing of a silicon nitride layer on a semiconductor device for increased density and etch

selectivity. Referring to Figure 2, Ngo discloses a silicon nitride topside passivation or protective dielectric layer (170) formed on a topside of a semiconductor device. However, in column 3, lines 24-26, Ngo states "[i]n accordance with embodiments of the present invention, a silicon nitride layer is deposited in a conventional manner, as by PEVCD ...". As stated in Applicant's specification, Plasma Enhanced Vapor Chemical Deposition (PEVCD) is the conventional method of depositing a passivation layer on a GaN structure and is performed after the structure is removed from an associated growth chamber. Thus, the combination of Gaska and Ngo fails to teach or suggest at least depositing a thermally assisted silicon nitride passivation layer on the one or more structural epitaxial layers before the GaN epitaxial structure is removed from an associated growth chamber. Accordingly, claim 14 is allowable.

For at least the same reasons claim 14 is allowable, claims 15-29 are allowable. However, Applicant reserves the right to further address the rejections of claims 15-29 in the future if necessary.

In view of the discussion above, claims 14-29 are allowable. Reconsideration is respectfully requested. If any issues remain, the examiner is encouraged to contact the undersigned attorney of record to expedite allowance and issue.

Respectfully submitted,

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